



Course Specification

(Bachelor)

Course Title: **Electricity for construction projects**

Course Code: **COE4105**

Program: **Bachelor of Construction Engineering**

Department: **Civil and Environmental Engineering Department**

College: **College of Engineering and Computing in Al-Qunfudhah**

Institution: **Umm Al-Qura University**

Version: **2nd**

Last Revision Date: **March 2025**



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A. General information about the course:

1. Course Identification

1. Credit hours: (2)

2. Course type

A. University College Department Track Others

B. Required Elective

3. Level/year at which this course is offered: (10/5)

4. Course General Description:

This course covers the fundamentals of electricity in construction projects, focusing on the design and analysis of electrical systems for buildings and infrastructure. Key topics include single-phase and three-phase power systems, load distribution, wiring layouts, circuit breaker sizing, and lightning protection. Emphasis is placed on developing practical skills to ensure safe, efficient, and compliant electrical installations in residential and commercial buildings, as well as street and road lighting in construction projects.

5. Pre-requirements for this course (if any):

Building Construction (COE3402)

6. Co-requisites for this course (if any):

7. Course Main Objective(s):

The main purpose of this course is to give the Construction Engineering student basic concepts on electrical circuit components and theories; with emphasis on electrical machines, transformers, distribution of electric power and wiring of buildings.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100 %
2	E-learning	None	None
3	Hybrid	None	None



No	Mode of Instruction	Contact Hours	Percentage
	<ul style="list-style-type: none"> Traditional classroom E-learning 		
4	Distance learning	None	

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	None
3.	Field	None
4.	Tutorial	None
5.	Others (specify)	None
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
...				
2.0	Skills			
2.1	Identify, formulate, and solve engineering problems in the area of circuits and systems.	S2	Lecture	Assignment, Quiz, Midterm and final exam
2.2	Design an electric system, components or process to meet desired needs within realistic constraints.	S2	Lecture	Assignment, Quiz, Midterm and final exam
3.0	Values, autonomy, and responsibility			
...				



C. Course Content

No	List of Topics	Contact Hours
1.	Course Description and Introduction to Electricity for construction projects	2
2.	Electrical Circuits: Elements, sources and connections, Resistance, Inductance & capacitance, Current source & voltage source, Series connections and parallel connections.	4
3.	DC & AC basic circuit analysis: Ohm & Kirchoff laws, Nodal & mesh analysis.	4
4.	Single-phase and three-phase systems: Sources and loads, Relationship between V_{ph} , I_{ph} , V_L and I_L , Power in 1ph and 3ph, Star connection and delta connection.	4
5.	Electrical Distribution in buildings: Types of loads (lighting & socket load), Distribution panel (circuit breaker & wire size and internal wiring)	2
6.	Internal Electrification design: Electrical layout in residential building using Auto CAD, Selection of house wiring, sizing and selection of conduit, Sizing and selection of switch socket, Calculation of load on circuit, Design of sub circuit (lighting circuit and power circuit), Distribution of power circuit, Calculation of fan, Calculation of earthing for residential buildings, Sizing and selection of low voltage switchgears (MCB, MCCB, RCB, RCBO MPCB)	6
7.	Protection of Buildings and Allied Structures Against Lightning: Method of lightening protection, Basic consideration for protection, Calculations for evaluating the need for protection, Calculation of protective angles and zone of protection for various forms of air termination, Selection of lightening protection device, Selection of ESE type lightening protection	6
8.	Quizzes and Midterm Exam	2
Total		30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignments	2, 5, 8, 11, 14	15%
2.	Quizzes	4, 11, 14	15%
3.	Midterm exam	7 or 8	30%
4.	Final exam	16 or 17	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources





Essential References	Charles K. Alexander, Matthew N. O. Sadiku. "Fundamentals of Electric Circuits", McGraw Hill Education; Sixth edition, February 2019. ISBN-13: 978-9353165505
Supportive References	<ul style="list-style-type: none"> Boylestad. "Introductory Circuit Analysis". Pearson; 12th edition (January 2013) ISBN-13: 978-9332518612 Hughes "Electrical and Electronic Technology", Pearson; 10th edition (January 2010) ISBN-13: 978-8131733660 Freeman, P.J. "Electric Power Transmission and Distribution", Harrap 1974. ISBN 13: 9780245524493
Electronic Materials	<ul style="list-style-type: none"> Electronic materials of the required textbook and its PowerPoints slides Umm Al-Qura LMS related contents
Other Learning Materials	None

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Equipped Classroom
Technology equipment (projector, smart board, software)	Blackboard, Data show, Smart Board
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Indirect
	Instructor	Direct
Effectiveness of Students assessment	Student	Indirect
	Instructor	Direct
Quality of learning resources	Student	Indirect
	Instructor	
The extent to which CLOs have been achieved	Instructor	Direct





Assessment Areas/Issues	Assessor	Assessment Methods
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify))

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Civil and Environmental Engineering Department Council in Al-Qunfudah
REFERENCE NO.	The fifteenth session of the academic year 1446
DATE	01/05/2025

